TOP ELECTRODE IN A STRONGLY OXIDIZING ENVIRONMENT

Abstract of the Disclosure

An improved charge storing device and methods for providing the same, the charge storing device comprising a conductor-insulator-conductor (CIC) sandwich. The CIC sandwich comprises a first conducting layer deposited on a semiconductor integrated circuit. The CIC sandwich further comprises a first insulating layer deposited over the first conducting layer in a flush manner. The first insulating layer comprises a structure having a plurality of oxygen cites and a plurality of oxygen atoms that partially fill the oxygen cites, wherein the unfilled oxygen cites define a concentration of oxygen vacancies. The CIC sandwich further comprises a second conducting layer deposited over the first insulating layer in a strongly oxidizing ambient so as to reduce the concentration of oxygen vacancies in the first insulating layer, so as to provide an oxygen-rich interface layer between the first insulating layer and the second conducting layer, and so as to trap a plurality of oxygen atoms within the second conducting layer. The oxygen-rich interface layer and second conducting layer act as oxygen vacancy sinks for absorbing migrating oxygen vacancies that originate from the first insulating layer to thereby reduce the concentration of oxygen vacancies in the first insulating layer and to thereby reduce the buildup of oxygen vacancies at the interface layer. Thus, the first insulating layer provides an increased dielectric constant and an increased resistance to current flowing therethrough so as to increase the capacitance of the CIC sandwich and so as to reduce leakage currents flowing through the CIC sandwich.

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